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13. ABSTRACT (Maximum 200 Words)

The mission of USAMRU-K is to develop and test improved products for the diagnosis, treatment and prevention of infectious disease threats to deployed service members. Surveillance activities are also conducted to identify and develop response strategies for global emerging infections with a potential to impact readiness, mission accomplishment, or homeland security. These activities are undertaken in research laboratories and field stations in locations where malaria, HIV/AIDS, leishmaniasis, West Nile virus, enteric pathogens, dengue, and other military-relevant infectious diseases are prevalent and their transmission rates are high. USAMRU-K also played a role in the execution of the President's Emergency Plan for AIDS Relief, a $15 billion program to provide prevention and care programs to HIV/AIDS victims in Africa. Malaria drug and vaccine trials were executed in Kombewa to provide valuable information that will inform protective strategies for the war fighter. During this three-year Cooperative Agreement, USAMRU-K's ability to successfully execute clinical studies has been enhanced by the construction of over 57,000 sq ft of additional space for state-of-the-art laboratories and support activities. The co-location of these modern clinical research facilities within high disease endemicity areas will position USAMRU-K as a preferred site for future vaccine, drug, and other interventional trials.

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Final Report March 2002 to March 2005

US ARMY MEDICAL RESEARCH UNIT - KENYA

The mission of USAMRU-K is to develop and test improved means for predicting, detecting, preventing and treating infectious disease threats to US military personnel deployed worldwide and to undertake global surveillance, training, research, and response to emerging infectious disease threats.

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PROGRAMS

Department of Malaria Immunology
Malaria Clinical Trials
LTC (P) Mark Withers
Background

Plasmodium falciparum malaria causes more than 1 million deaths per year. In lowland holoendemic areas of sub-Saharan Africa, such as in western Kenya, it is the children who bear the brunt of the morbidity and mortality due to malaria. Malaria in western Kenya is holoendemic. Malaria transmission occurs all year but at a very high level during the two rainy seasons. Several malaria chemotherapy and epidemi-ology studies have been done on the adult population for decades. These studies typically demonstrate about 90% prevalence of parasitemia over 12 weeks during a high malaria transmission period.

The Walter Reed Project (WRP) and the Kenya Medical Research Institute (KEMRI) have been involved in malaria research in western Kenya for many years. These studies cover nearly every aspect of the disease - epidemiology, entomology, immunology, hospital-based treatment trials, and community-based studies of anti-malarials. The WRP/KEMRI laboratories near Kisumu have served as the base for both phase I and II trials of candidate malaria vaccines and antimalarial drugs over the past decade. In spite of these research efforts, malaria infections in this area continue unabated and improved control strategies are needed.

Worldwide, the populations at risk for malaria include not only the infants, children and adults in malaria-endemic regions, but also non-immune travelers to malarious areas. This includes vacationers and deploying military personnel. A safe and effective vaccine that prevented infection, or even merely checked the clinical symptoms, of *P. falciparum* malaria would be a milestone public health achievement and would bolster efforts to control this most insidious infectious disease around the world. The increasing prevalence of drug resistance in various malaria strains makes the development of an effective vaccine an international priority in the struggle for control of this devastating disease.

The target population for this particular vaccine is children at risk for clinical disease (including severe disease) due to infection with *P. falciparum*. The Walter Reed Army Institute of Research in collaboration with the Malaria Vaccine Initiative and GlaxoSmithKline are undertaking multi-year clinical studies to test the safety and efficacy of MSP-1 at USAMRU-K. MSP-1 can only be tested for proof of concept in populations with high malaria transmission rates, as there is no predictive animal model and no reliable challenge system to detect efficacy against clinical malaria. This vaccine construct has been tested in malaria naïve adults (US) to establish safety, reactogenicity and to identify a dose for further evaluation. It was subsequently evaluated in semi-immune Kenyan adults and has been found to be safe, well tolerated & immunogenic in

this population. An epidemiological study and a dose escalating and age stratified Phase 1 clinical trial are in progress to provide safety and baseline data in children in anticipation of Phase 2b efficacy trial in FY05.

2002:

1. Oversaw building construction, borehole drilling, equipment & furniture purchases, practical completion, building turnover & inauguration ceremonies & operational & personnel transition at the new WRP Kombewa Clinic.
2. Hired, assembled & trained a highly professional team of clinicians, nurses, lab technicians & field workers to execute complex clinical trials in the new Kombewa Clinic.
3. Led the above team in the development of SOPs, clinical treatment guidelines, & job descriptions at the new facility.
4. Provided critical assistance & oversight to a highly successfully executed immunization phase of an FMP-1 phase I trial in adults; the first trial of an MSP-1 based vaccine in Africa.

2003:

5. Launched & completed the vaccination phase (9 vaccinations from July to Nov 03) of the first FMP-1 vaccine trial in Africa & the first such trial in children anywhere in the world (a phase I trial in 135 subjects); All regulatory requirements were met with only a 9% vaccination attrition rate & a 98% follow up compliance rate.
6. Launched a 1 year, longitudinal, cohort (epidemiology) trial of malaria infection dynamics in 270 children; All regulatory requirements were met with only a 14% attrition rate.
7. Negotiated an augmentation (18%) of the funding from the Malaria Vaccine Initiative for the ongoing $3.4 million, 4-year project to support the operational budgets of trials & the construction of a complex of laboratories & clinical facilities, & thus positioning the Kisumu sub-location as a preeminent, state-of-the-art malaria research facility well into the coming century.
8. Coordinated with architect/contractor & oversaw the initiation of construction on the new pediatric ward (64-beds; 18,000 sq ft) & WRP office/lab facility (43-rooms; 11,000 sq ft) at NNPGH, Kisumu, Kenya.
10. Established an active Pediatric Ward Migration Committee at NNPGH that will lead to significant improvement in the delivery of pediatric care, more efficient & cost-effective management, better staffing & improved employee morale upon migration to the new building facility.
11. Augmented & maintained the highly professional team of clinicians, nurses, laboratory technicians, & field workers executing clinical trials at the Kombewa Clinic; Led this team in the preparations for FMP-1 & drugs trials by developing numerous SOPs, clinical treatment guidelines, personnel actions & countless other day-to-day administration activities.

2004:

12. Successfully completed, closed & reported on a phase I malaria vaccine trial in 135 children (Aug 03 to Sep 04) of the first FMP1 in Africa & the first such trial

in children anywhere in the world; Confidential presentation of the favorable safety & immunogenicity data to the DSMB (London, May 04) resulted in 'green-light' for follow-on phase IIb study; Featured public presentation at the premier tropical medicine conference (Miami, Nov 04) met with general acclaim.

13. Completed a 1year, longitudinal, cohort (epidemiology) trial of malaria infection dynamics in 270 children in support of the upcoming phase IIb vaccine trial.
14. Negotiated an augmentation ($1.7 M to $2.4 M) of the final phase of funding from the Malaria Vaccine Initiative for the (now) $4.2 M, 4-year project to support the operational aspects of the upcoming phase IIb vaccine trial.
15. Coordinated with architect/contractor & oversaw the completion of construction on the new pediatric ward (64-beds; 18,000 sq ft) & WRP office/lab facility (43-rooms; 11,000 sq ft) at NNPGH, Kisumu, Kenya; Facilities were officially dedicated by the USAMRMC CG & US ambassador to Kenya on 28 Oct 04 & the projects came in only $8K over-budget.
17. Successfully augmented & maintained the highly professional team of physicians, clinicians, nurses, laboratory technicians, & field workers for executing clinical trials at the Kombewa Clinic; Led this team in the preparations for FMP1 & drugs trials by developing numerous SOPs, clinical treatment guidelines, personnel actions & countless other day-to-day administration activities.

Malaria Pathogenesis - 1
COL Jose Stoute

Background:

Plasmodium falciparum malaria causes more than 1 million deaths per year. Most of these deaths occur as the result of complications such as severe malarial anemia and cerebral malaria. In lowland holoendemic areas of sub-Saharan Africa, such as in western Kenya, it is the children who bear the brunt of the morbidity and mortality due to malaria. Here, the most common complication is severe malarial anemia that occurs from a few months after birth, when transplacental immunity begins to wane, up to 24 months of age. Cerebral malaria is relatively rare in holoendemic areas and, when it occurs, it is usually seen in 2 to 5-year-olds. Adults are not as susceptible as children due to the acquisition of immunity after prolonged exposure. By contrast, in areas of the world with low transmission severe malarial anemia is still confined to young children but cerebral malaria makes up a larger proportion of the cases of severe malaria and is more common in older children and adults. Our research program aims to increase our understanding of the pathogenesis and the contrasting epidemiology of these two conditions.

To understand the pathogenesis of severe malarial anemia, we have examined the role of RBC complement regulatory proteins in malaria. Complement receptor 1 (CR1, CD35), decay accelerating factor (DAF, CD55), and membrane inhibitor of reactive lysis (MIRL, CD59) are RBC surface proteins that promote the inactivation and binding of C3b in immune complexes (ICs) (CR1), promote inactivation of C3b convertases (CD55), and interfere with the assembly of the membrane attack complex C5b-9 (CD59). Consequently, complement regulatory proteins may play an important role in protecting RBCs from complement activation and IC formation that occurs during malaria infection. In support of this hypothesis, work from our laboratory has shown that RBCs of children with severe malarial anemia are deficient in the complement regulatory proteins CR1 and CD55. In addition, we have shown that there is pattern of age-related expression of RBC complement regulatory proteins being low in young children and high in adults. These results have important implications for the role of complement regulatory proteins in the pathogenesis of severe malaria.

In addition to its potential role in the development of severe malarial anemia, CR1 has been implicated in the pathogenesis of cerebral malaria. RBCs infected with mature malaria parasites (trophozoites and schizonts) form rosettes by binding to CR1 present on the surface of uninfected RBCs. As the number of CR1 molecules on RBCs increases, so does their propensity to form rosettes. Rosette formation has been linked to the development of cerebral malaria, as it is more common in parasite cultures from patients with cerebral malaria than in cultures from patients with uncomplicated malaria. Rosettes are thought to play a role in the pathogenesis of cerebral malaria by plugging cerebral capillaries thereby interfering with cerebral blood flow. We have identified two polymorphisms of the Knops blood group in CR1 that are associated with protection from severe malaria, in particular cerebral malaria (4). This finding will allow a better understanding of the role of CR1 in the pathogenesis of severe malaria.

Research Accomplishments:

1. Demonstrated differences in level of expression of CR1 and CD55 in children with severe malarial anemia and controls, and children with cerebral malaria and controls.
2. Showed that RBC complement regulatory proteins have an age-dependent pattern of expression increasing from childhood to adulthood [3].
3. Showed that children with severe malaria have increased levels of immune complexes [4].
4. Identified a CR1 polymorphism associated with decreased susceptibility to severe malaria. Manuscript submitted.

References:

1. Stoute, J. A. et al. (2003) Loss of red blood cell-complement regulatory proteins and increased levels of circulating immune complexes are associated with severe malarial anemia. J. Infect. Dis. 187, 522-525
2. Waitumbi, J. N. et al. (2000) Red cell surface changes and erythrophagocytosis in children with severe plasmodium falciparum anemia. Blood 95, 1481-1486
3. Waitumbi, J. N. et al. (2004) Age-related changes in red blood cell complement regulatory proteins and susceptibility to severe malaria. J Infect Dis 190, 1183-1191
4. Erick K. Mibei, Alloys SS Orago, and José A. Stoute . Immune complex levels in children with severe plasmodium falciparum malaria. Am J Trop Med Hyg In Press

Malaria Pathogenesis -2
Dr. John Waitumbi

Background:

Non-immune patients infected with *P. falciparum* develop varying levels of disease severity. In the individuals who develop severe malaria, one of the most obvious parameter that is associated with severity is the level of parasite density. In the absence of specific anti-parasitic immune responses in non-immune individuals, it is reasonable to assume that certain strains of *P. falciparum* cause severe disease because they have an imbalance between cell proliferation and cell loss. This assumption is strengthened by observation: 1) chemoprophylaxis that solely limits parasitemia reduces morbidity and mortality and 2) the in vitro growth rate of parasites differ intrinsically between strains. Thus, understanding the basic mechanisms that underlie cell death may point to potentially new targets for therapeutic interventions to slow cell proliferation. One of the physiological mechanisms of reducing cell numbers is by apoptosis. Apoptosis is an

active biochemical process that involves changes on three essential cellular components, namely, DNA, protein and lipid and once initiated irreversibly commit cells to death.

The molecular mechanisms involved in apoptosis are complex but they eventually involve DNA fragmentation, activation of caspaces and externalization of phosphatidylserine (PS). DNA double strand cleavage in apoptotic cells occurs at the linker regions between nucleosomes to produce fragments that are multiples of approximately 185 bp. These fragments can easily be demonstrated by agarose gel electrophoresis as characteristic ladders. *De novo* protein synthesis and/or the modification of existing proteins (such as caspaces) is another important attribute of apoptosis. Finally, lipids are also involved and several apoptotic pathways use signal-transduction pathways based on membrane receptors and membrane-derived phospholipid precursors as second messengers.

This study proposes to determine whether there are fundamental differences in the apoptotic processes between strains of *P. falciparum* that maintain low parasite densities and those that maintain high parasite densities as measured by cell cycle distribution of DNA, DNA fragmentation and externalization of PS.

Accomplishments:

1. Established two *P. falciparum* cell lines with differential growth doubling time: These PF strains will be used to study whether apoptosis is involved in growth rate regulation.

Trainees:
PhD candidate thesis - The role of apoptosis in regulating *P. falciparum* cell numbers in non-immune individuals.

2005 Specific Accomplishments:

We have recruited over 250 participants in a case-control study of severe malaria in western Kenya. Samples of blood were collected at enrollment and two months following enrollment. The main objective of the study was to carry out functional assays of complement regulatory protein activity to determine if there are differences between erythrocytes of children with severe malaria and uncomplicated malaria. These assays are now being concluded and data analysis will begin soon.

Training Accomplishments:
Currently the program supports the work of 3 Ph.D. candidates and 3 Masters of Science candidates, all of whom are enrolled in local universities.

Department of Anti-malarial Drug Discovery
MAJ Shon Remich
Background:

Our scientific research is conducted in two separate laboratories with distinct but complimentary efforts. The Malaria Drug Screening Laboratory conducts research aimed at malaria drug discovery and drug resistance. Malaria drug discovery efforts currently test natural products, both as plant extracts and purified compounds, for their ability to kill the malaria parasite in culture. These efforts are aimed at identifying a naturally produced compound that can be transitioned into advanced development as a new anti-malarial drug. Drug resistance research is in support of the USAMRU-K GEIS program which has identified several geographically distinct areas of Kenya and Uganda where malaria parasites are collected, transported to the laboratory, and tested against a panel of 15 known anti-malarial drugs for their drug susceptibility profiles. This laboratory also will support malaria drug clinical trials with the culturing and testing of field isolates of malaria. The Molecular Malaria Laboratory conducts scientific research aimed at understanding the molecular mechanisms of drug resistance. Several genes are well characterized as obtaining mutations that confer resistance to several currently prescribed anti-malarial drugs. Identification of these mutations allows our laboratory to assess the severity of drug resistant malaria and provide indications as to the effectiveness of current and future anti-malaria therapies. This laboratory also conducts basic science projects aimed at identifying Plasmodial enzyme pathways that can be targeted for drug discovery.

FY03 saw a shift in the emphasis in the drug development to clinical studies. Approximately 18 personnel were hired to assist and $130,000 of new laboratory equipment was ordered in develop and execute drug related trials.

Accomplishments:

1. Project execution: In July 2004, a phase II azithromycin + chloroquine regulated (IND) trial was initiated with Pfizer as a co-development partner.
2. Project execution: In June 2004, the first multi-national and international microscopy training session was initiated and completed. Over 50 microscopists participated in this training representing 3 different countries and over 8 different organizations involved in drug and vaccine development. This training set the foundation for a full fledged and funded "excellence in microscopy" education center. This venture was predominantly supported fiscally and logistically by the drug program (funding, personnel, supplies, travel, etc.)
3. Project development: Funds ($65,000) have been allotted for development of the Kombewa Sub-district hospital upgrade with the assertion that this site could be used to further support clinical trials at Kombewa
4. Project development: Pre-trail development was completed for the 250 subject Maseno University malaria surveillance and surrogate marker for exposure and immunity trial which was subsequently initiated in Jan 2005.

5. Project Development: Funding was awarded (payable 2005) for a Phase II pharmacokinetic study in adults $400,000. Planned execution 2005.
6. Project Development: Funding was awarded for a Phase II Pediatric population pharmacokinetic study (payable 2005) $500,000. Planned execution 2005.

Department of Entomology. (STEP I. U):
LTC Van Sherwood
Background:
In FY03, the Entomology program at USAMRU-Kenya supported three primary research programs in Kenya. These programs covered malaria research in western Kenya and the city of Nairobi and arbovirus vector research along the coast of Kenya. Approximately 40 casual (full-time) employees were hired to assist in these programs and two vehicles were dedicated for support of the entomology project in western Kenya. An entomology laboratory was established at headquarters in Nairobi that supports specimen identification, storage (-70°C freezers), and PCR requirements.

The project in western Kenya was designed to study the ecology of malaria vectors with the use of remote sensing and GIS to develop a new dry season malaria vector control strategy. The combined vector, environmental, and map database were used to address questions about malaria transmission focality. Maps of the site were constructed using the differential global positioning system (GPS). The maps include permanent water sources and areas to find malaria vector eggs during the dry season. On-site mosquito collections provided data for Entomological Inoculation Rates (EIRs) which indicated that the highest monthly EIR was 0.14, or an infective bite every three days in May. It was also determined that *An. funestus* tend to seek blood meals earlier than infective *An. gambiae*. This finding will have significant impact on transmission, and on assessment of disease risk since early biting infective vectors are more likely to find unprotected hosts.

In Nairobi, a malaria vector surveillance program established in the Kibera shantytown, a district of the city with >700,000 inhabitants was continued. Urban malaria is having an increasing impact in sub-Saharan Africa and in Nairobi the ecology is further confounded by the fact that the city is at an altitude of approximately 1 mile. Two of the most important vectors, *An. gambiae* and *An. arabiensis,* were found throughout the year in Kibera although at extremely low population densities. It appears that during the drier seasons these vectors are breeding in polluted streams that border the edge of the shantytown. No infected vectors were collected; however, our collections were not conducted specifically in areas of suspected local transmission based on travel histories of infected individuals.

Recent data from the Coast Province indicated ongoing dengue transmission. An arbovirus surveillance program was established that initially focused on vector surveillance in the localities of the identified infections. Household vector surveillance

was conducted throughout the year and collected eggs from ovicups to determine the presence/absence of the vector in the area. *Aedes aegypti* is the primary dengue vector but other potential vector species are present. *Ae. aegypti* is not usually found indoors although larvae are quite abundant especially during the rainy seasons. Temperature and humidity data for the study area was collected. A human use protocol for a dengue serosurveillance study was submitted through KEMRI. Potential study sites were identified in Mombasa and Malindi. In addition to these studies, entomology provided support for CONUS based programs to include phase one of the Dengue Vector Control System device testing. This 15 week test program was designed to evaluate the effectiveness of traps for collecting dengue vectors. Support was also provided for several leishmaniasis programs/protocols.

Accomplishments:

- (2002 – present) **Characterization of malaria transmission in Western Kenya.** Started as a multi-year project in mid-2002 in support of a new vaccine study site when the malaria vaccine program moved to a new study site in the vicinity of Kombewa to establish the relative importance of *An. gambiae* and *An. funestus*, determine biting pressure and malaria infectivity of the vector, and study the dry season ecology of *An. gambiae*. This project is on-going.
- (2002) **Validation of the VecTest malaria panel dipstick assay.** In collaboration with Jeff Ryan and WRAIR. Three separate studies using 5,000 mosquitoes each, each mosquito was assayed using the VecTest strips, and a comparative sporozoite ELISA was performed on each, which demonstrated positive efficacy leading to manufacture and dissemination of the Malaria VecTest. (Published data – see below).
- (2002) **Highland malaria transmission study.** Infective adult malaria vectors were collected in the Kerenga area of Brooke-Bond Tea Estate, Kericho, confirming local transmission at altitude. (Publication in preparation – see below)
- (2002) ***Anopheles gambiae* immune gene variant project.** In collaboration with Shirley Luckhart, managed the field portion of this study, involving two *Anopheles* collection trips each to Western Kenya and the Kenya coast. (Published data – see below).
- (2002) **Rift Valley Fever outbreak investigation**. In conjunction with the CDC. Collected approximately 80,000 mosquitoes in areas of recent RVF activity in an attempt to verify vector transmission. Mosquitoes transported to Dr. Peter Jupp in South Africa.
- (2002 - 2003) **Spotted fever rickettsiosis in Kenya**. Prompted by deficiencies in the understanding of the epidemiology of African Tick Bite Fever (ATBF) throughout most of sub-Saharan Africa and a recent ATBF case report, we adopted an integrated approach employing entomological investigations, remote sensing, and GIS to examine the risk of ATBF in the Masai Mara Region of Kenya. This study involved the collection of tick samples from Maasai Mara game reserve in Kenya on three separate expeditions; April (rainy season), September (dry season), and December (short rains). We have determined the presence of the spotted fever group rickettsiae (SFG) in Maasai Mara mainly in *Amblyomma variegatum* ticks. Assaying tick samples continues. Methods for mapping potential habitats for vectors of ATBF in Maasai Mara Region of Kenya was presented at the DoD Pest Management Workshop, 2004. (Study data are being prepared for publishing)

• (2002 – 2004) **Nairobi malaria transmission study**. The increase of urbanization throughout Sub-Saharan Africa and accompanying population mobility is introducing malaria into areas previously considered malaria free. We conducted a study of anopheline mosquitoes in Kibera, a shantytown area of Nairobi, confirming the presence of infected vectors, primarily *Anopheles arabiensis*. The data for the study have been presented in two international conferences (American Society of Tropical Medicine and Hygiene (2004) and the African Health Science Congress (2004). (Publication in preparation – see below)

• (2003) **Evaluation of a Lethal Ovitrap (LO) for Dengue Mosquito Vectors**. The goal of this study was to determine the efficacy of lethal ovitrapping in suppression of dengue mosquito vector populations in the Coast Province of Kenya over a twelve-week treatment period. Statistically, the traps demonstrated no effectiveness to control dengue mosquito populations, resulting in the traps not being further developed. These data were submitted to WRAIR and have not been published.

• (2003) **GIS Mapping of HIV/AIDS Study Estates.** Product delivered: Maps of all the estates within James Finlay Co.Ltd involved in the HIV study including road network and health facilities. These maps will facilitate follow up of volunteers by clinical staff, and will further be developed by assimilating HIV study findings into the database for conclusion, comparison, and trend analysis.

• (2004) **Field evaluation of novel arthropod repellents and repellent formulations**. Three repellent trials in May, July, and December 2004 were conducted against wild mosquitoes in western Kenya. Five repellents - SS 220 lotion (Avon), Bayrepel lotion (Avon), 33% Deet, SS 220 spray (Avon) and Bayrepel lotion (ACJohnson) were tested at application rates 1.5g/600 cm^2 and 1g/600cm^2. No repellent failed over the 12 hour trial periods demonstrating parity among the repellents. In addition, no statistical difference was demonstrated between treated limbs of each volunteer, demonstrating a volunteer may act as his own control. These data were presented at the American Journal of Tropical Medicine and Hygiene in October 04, and are being prepared for publishing.

• (2004) **Hemorrhagic fever outbreak investigation in Lamu, Kenya.** In conjunction with CDC and GEIS, aided in the entomological support of this investigation. Entomological data suggested the pathogen may not be the originally suspected O'nyong nyong fever virus.

• (2005) **Alphavirus Surveillance Group** In collaboration with CDC (Dr. Brieman), GEIS, and several Kenyan organizations, we are part of this group established as a follow-up to the hemorrhagic investigations conducted in Lamu and Mombassa, and in preparation for future outbreaks in east Africa.

• (2005) **Rift Valley Fever Virus (RVFV) Group.** In collaboration with CDC Atlanta and CDC Nairobi, GEIS, and several Kenyan organizations, we will conduct the entomological support for this effort to survey for RVFV in Kenya.

Publications:

Luckhart, S., L. Keying, R. Dunton, E.E. Lewis, A. L. Crampton, J. R. Ryan, and R. Rosenberg (2003) ***Anopheles gambiae*** **immune gene variants associated with**

natural *Plasmodium* infection. Molecular and Biochemical Parasitology 128: 83-86.

Ryan, J.R., Dave K., Collins K.M., Hochberg L., Sattabongkot J., Coleman R.E., Dunton R.F., Bangs M.J., Mbogo C.M., Cooper R.D., Schoeler G. B., Rubio Y., Magris M., Romero L. I., Padilla N., Quakyi I. A., Leke R. G., Curtis C. F., Evans B., Walsey M., Patterson P., Wirtz R. A. and Chan A. S. T. 2002. **Extensive Multiple Test Center Evaluation of the VecTestÔ Malaria Antigen Panel Assay. Vet. Med. Entomol. 16: 321-327.**

Department of HIV/AIDS (STEP H.)
LTC Ginamarie Foglia

Background:

By 2010, there will be 45 million new HIV infections for a total of 105 million worldwide. By 2020, more that 70 million deaths will be attributed to HIV which is more than all the soldiers killed during World War II. HIV/AIDS is one of the biggest threats to global health and stability. While the epidemic has reached a plateau in the developed countries, it is still on the increase in developing countries. Out of 42 million infected with HIV, 29 million are from sub-Saharan Africa accounting for 70% of all infections. The Demographic Health Survey (DHS) conducted by the Kenya Ministry of Health in 2003 revealed an overall HIV prevalence of around 6.7% with variation according to gender and location. Young women between the ages of 20-24 are almost four times as likely to be infected as men in the same age cohort (8.7 versus 2.4 %). Prevalence in urban areas is almost twice that in rural areas.

Despite the ravages imposed by HIV/AIDS on the Kenyan people, there are some encouraging trends. Sustained prevention efforts focusing on information, education and communication that reach down to the village level are in place in many Kenyan districts to hopefully subdue this epidemic. Progress is also being made on the treatment and care of HIV-infected patients. Kenyan and international researchers have already conducted a few HIV vaccine trials and have developed National HIV/AIDS Vaccine Research Guidelines for future proposed Phase I-III HIV vaccine trials in Kenya.

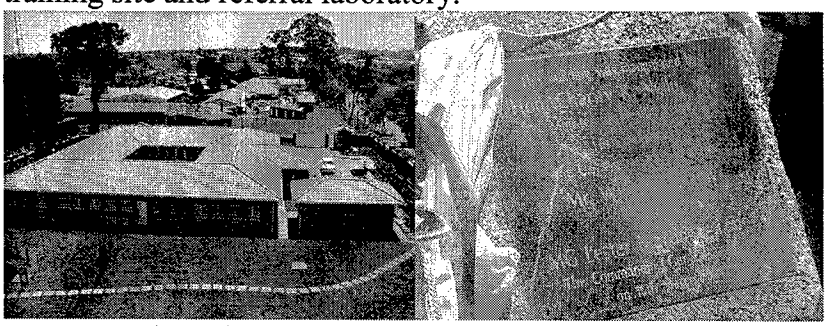
The United States Army Medical Research Unit – Kenya (USAMRU-K) HIV/AIDS Program is the primary field station for the U.S. Military HIV Program, also known as The Walter Reed Project (WRP). The USAMRU-K HIV/AIDS Program is located in Kericho, Kenya approximately 300km northwest of Nairobi. It has 85 core staff and 67 temporary staff drawn from the HIV program and other collaborating projects working in various departments: Administration, Clinical, Laboratory, Field Operations, Information Systems & Data Management, Transportation and Security. The

primary mission of the Project is to develop strategies to prevent HIV infection globally through 1) education and prevention, 2) research and development, 3) care and treatment and 4) health policy development. The primary objective of this effort is establishing a vaccine for HIV.

Core Research Activities

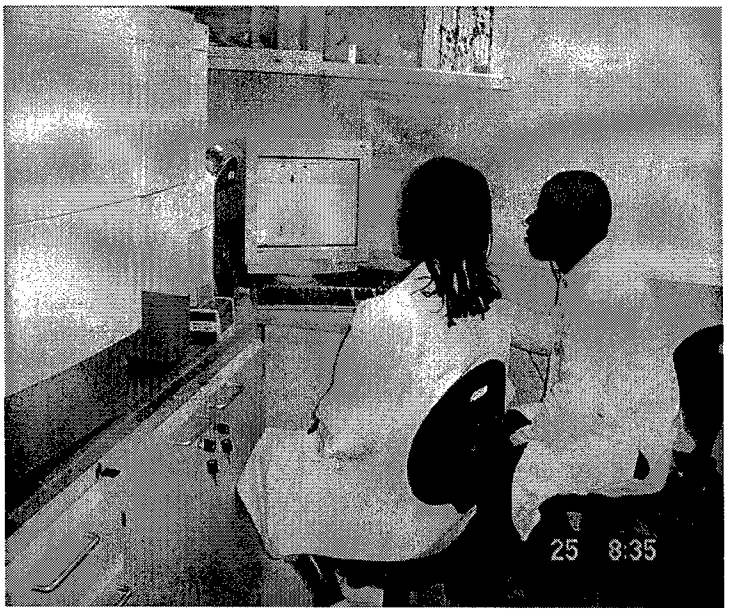
A key element in developing a vaccine is to appropriately identify cohorts in which to conduct vaccine trials. In June 2003, we commenced our HIV Vaccine Development Cohort at James Finlay Kenya (Ltd) Tea Plantation with the following objectives among others: (1) estimate the incidence and prevalence of HIV, (2) characterize the risk factors associated with HIV infection, (3) determine the viral clade and recombinations of HIV-1 in this part of Kenya, (4) characterize the kinetics of HIV-specific immune responses, CD4 counts and viral loads in early HIV infection and in the face of malaria co-infection, and (5) characterize the drug resistance patterns of *Plasmodium* species.

The current available information from our HIV Vaccine Cohort Development Study reveals an HIV prevalence of 14.5% with variation according to gender and tribal affiliation. Normal and abnormal laboratory values for this population have been determined and shared with regional hospitals and dispensaries. Recently, eight abstracts were presented at the XV International AIDS Conference in Bangkok, Thailand describing the HIV epidemic in this rural cohort and noted that over 90% of the study volunteers would be willing to participate in future HIV vaccine trials. WRP plans to commence Phase I/II HIV-1 vaccine and therapeutics trials in collaboration with the National Institutes of Health, Division of AIDS, at the James Finlay Kenya plantation site and other sites in 2005. A 7,000 square-
foot state-of-the-art Clinical Research Center (CRC) was inaugurated in March 2004 to serve as the USAMRU-K HIV/AIDS Program headquarters, regional clinical research training site and referral laboratory.

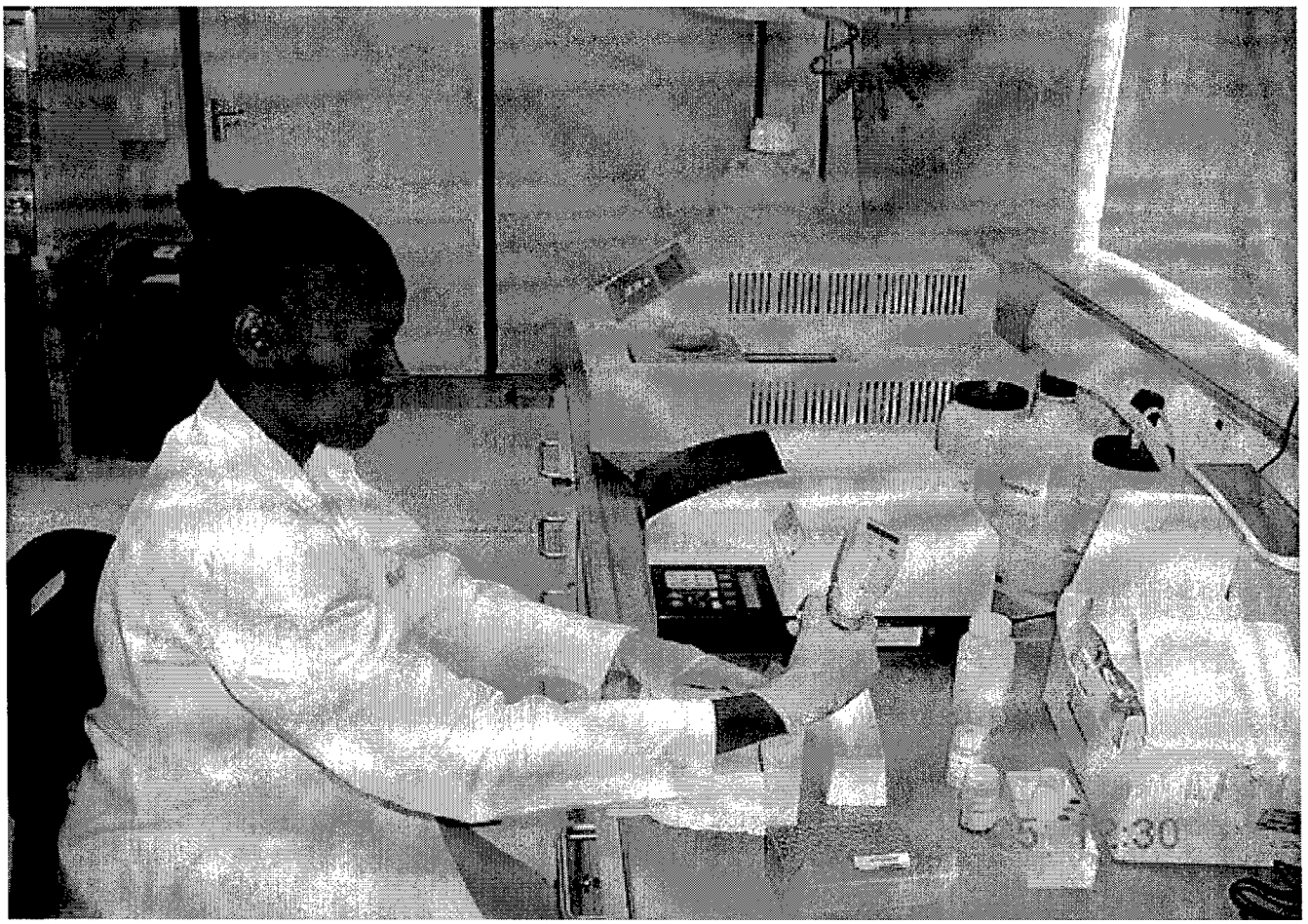


WRP Clinical Research Center and Inauguration Plaque

Mobile Operational Field Research by Tent in the Tea Plantations



CRC's 4-color Flow Cytometer to Determine CD4 Counts



CRC Lab Technician Performing HIV Viral Load Testing

Prevention of Mother to Child Transmission of HIV Infection Program

The WRP Prevention of Mother to Child Transmission of HIV Infection (PMTCT) Program commenced in August 2001 in three hospitals and has now expanded to a total of 40 health facilities. Antenatal clients are offered PMTCT services with routine reproductive health care. Seventy three nurses have been trained in PMTCT counseling with some receiving further training in rapid HIV antibody testing and "training of trainers". There were 26,178 new antenatal cases. 15,531 (59%) pregnant women were offered PMTCT counseling, out of which, 14,774 (95%) accepted to be tested. 12,774 (86%) of those tested received their results. Mothers 1288 (8.7%) of the pregnant women were HIV infected and 903 (70%) of them and 495 (39%) of their infants were given Nevirapine. The percentage of pregnant women offered counseling has increased from an initial 4% in the first 4 months of the program to approximately 100% in the last 11 months.

PMTCT Program Implementing Group Counseling

Boston University Collaboration

WRP began collaborating in January 2002 with Boston University to evaluate to the impact of HIV/AIDS upon labor productivity at James Finlay Kenya. The objectives of the study were to 1) estimate the decline in on-the-job labor productivity associated with HIV/AIDS, 2) estimate the additional paid and unpaid leave taken by workers with

HIV/AIDS, 3) estimate shifts of workers to light duty and 4) calculate the earnings loss caused by HIV/AIDS and malaria. The study ended in December 2003.

In comparing workers without HIV/AIDS to workers with HIV/AIDS, the study found that workers with HIV/AIDS on average were absent 31 more days (increase of 87%), spent 22 more days on light duty (increase of 66%), produced an average of 7.1kg less tea leaf plucked per day (decrease of 17%), and had overall earnings decreased by 18%. One caution noted in the study regarding the results was that since workers often bring unrecorded "helpers" to the field, the actual differences may be even greater.

The WRP-Boston University team published their results recently in a manuscript entitled "The impact of HIV/AIDS on labour productivity in Kenya" in the *Tropical Medicine and International Health Journal* (March 2004). The study is continuing to now evaluate the impact of malaria on labor productivity. In the future, it is anticipated that the WRP-Boston University will work with James Finlay Kenya to evaluate the impact of HIV/AIDS drug treatment on labor productivity.

President Bush's Emergency Plan for AIDS Relief (PEPFAR)

In April this year, several Kericho hospitals began offering comprehensive HIV/AIDS care and treatment through the Walter Reed Project and the United States' "President's Emergency Plan for AIDS Relief." The President's Emergency Plan is a 5-year, 15 billion dollar program offering comprehensive HIV/AIDS care and treatment worldwide including 15 focus countries, 12 in Africa. In excess of 70 million dollars will be introduced in to Kenya this fiscal year for HIV/AIDS care and treatment. As one of the United States Government Agencies involved in the President's Emergency Plan in Kenya, the United States Army Military Research Unit/Walter Reed Project has implemented comprehensive HIV/AIDS care in western Kenya.

A focus of the President's Emergency Plan is the provision of anti-retroviral therapy to individuals with HIV/AIDS who need therapy. In April, WRP partners at the Kericho District, bordering tea plantation and faith-based hospitals/dispensaries began treating HIV-infected patients and their affected family members with medicines provided by the Walter Reed Project under the President's Emergency Plan. By the end of December 2004, over 1000 patients had been started on anti-retroviral therapy, and approximately 1400 others not yet warranting anti-retroviral therapy, have been incorporated into the program to receive other HIV/AIDS care and support. In addition, funds under the President's Emergency Plan have been used to improve regional hospital laboratories and train clinical teams to administer and monitor antiretroviral and opportunistic infection treatment. Several counselors have also been trained to promote HIV educational and prevention messages as well. WRP, through its implementing partners, plans to offer comprehensive HIV/AIDS care to over 8,000 patients in western Kenya by March 31, 2005.

Other Accomplishments

1. Instituted community programs for voluntary counseling and testing in 2000-present.
2. Completed Good Clinical Practice training for over 200 African researchers and staff in September 2001 at Nairobi, Kenya.
3. Completed seminar on antiretroviral therapy for the Kericho branch of the Kenya Medical Association in 2001.
4. Completed Good Laboratory Practice training for over 200 African researchers and staff in May 2002 at Nairobi, Kenya.
5. Donate essential medications to local Kericho hospitals in 2002-present.
6. Developed HIV Postexposure Programs (PEP) for Kericho Hospitals and sponsored training of their Medical Officers supervising PEP in September 2002. Our PEP has been transferred successfully to other laboratories in Kenya, Uganda and Tanzania.
7. Developed Community Advisory Board for all clinical studies executed in Kericho by WRP.
8. Granted AIDS Vaccine Advocacy Coalition (AVAC) funding to purchase essential medical equipment for the Kericho District Hospital Maternity and Delivery Wards in January 2003 and January 2004 to help prevent the transmission of HIV from mother to child.
9. Commenced Proficiency Testing in 2003 of all ELISA/WB and rapid HIV tests to maintain quality assurance and control at all laboratory sites involved in the WRP HIV Vaccine Cohort Development and Elizabeth Glaser Pediatric AIDS Fund for Prevention of Mother to Child HIV Transmission.
10. Completed Rapid HIV test study in August 2003 to determine accuracy and most useful algorithm of current and future HIV Rapid Tests in Kenya. Results have been published in the August 2004 issue of the *Journal of Clinical Microbiology*.
11. Completed Phase I of Boston University collaborative study, "The Impact of HIV/AIDS on Labour Productivity in Kenya", and results published in the *Journal of Tropical Medicine and International Health* in March 2004.
12. Granted Phizer Free Donation of Diflucan in December 2003 and December 2004 to treat HIV-infected patients with cryptococcal meningitis and esophageal candidiasis.
13. Granted Determine HIV Rapid Test Donation in 2003 and 2004 for Prevention of Mother to Child HIV Transmission Program in the Kericho region.
14. Installed and trained IT and Laboratory Staff on new state-of-the-art data management and information systems infrastructure from July 2003 – present. Data is managed by the clinworX 4.1 system. This client-server based system consists of Oracle-based databases and Oracle Forms interface. clinworX consists of four interdependent systems which assist research in managing clinical, laboratory, and specimen data, as well as, tracking participant registration and enrollment, and study personnel management.
15. Appointed by the Kenyan Ministry of Health in 2003 to serve on the National AIDS Contol Program to advise the Minister of Health on HIV Care and Treatment issues.

16. Appointed by the Kenyan Ministry of Health in 2004 to serve on the National HIV Vaccine Expert Sub-committee to develop national HIV/AIDS vaccine strategies, guidelines and monitoring for Kenya.
17. Completed 4,000 square foot Maternal Child Health Clinic and Counseling Center at the Kericho District Hospital in March 2004.
18. Assisting the Kenya Medical Research Institute in developing an Institutional Biosafety Committee to implement all NIH-funded trials of vaccines containing recombinant DNA or RNA derived from recombinant DNA in 2004.
19. Commenced collaboration with University of Nairobi to mentor their students in our laboratory for their Master's degree thesis project.
20. Sponsored five WRP Kericho Staff to obtain their Master's degree in either Public Health, Public Administration or Biometry from 2002 – present.
21. Sponsor continuing training/education for all WRP staff to accomplish their mission successfully from 2002- present.

Summary:

The mission of USAMRU-K is to develop and test improved products for the diagnosis, treatment and prevention of infectious disease threats to deployed service members. Surveillance activities are also conducted to identify and develop response strategies for global emerging infections with a potential to impact readiness, mission accomplishment, or homeland security. These activities are undertaken in research laboratories and field stations in locations where malaria, HIV/AIDS, leishmaniasis, West Nile virus, enteric pathogens, dengue, and other military-relevant infectious diseases are prevalent and their transmission rates are high.USAMRU-K also played a role in the execution of the President's Emergency Plan for AIDS Relief, a $15 billion program to provide prevention and care programs to HIV/AIDS victims in Africa. Malaria drug and vaccine trials were executed in Kombewa to provide valuable information that will inform protective strategies for the war fighter. During this three-year Cooperative Agreement, USAMRU-K's ability to successfully execute clinical studies has been enhanced by the construction of over 57,000 sq ft of additional space for state-of-the-art laboratories and support activities. The co-location of these modern clinical research facilities within high disease endemicity areas will position USAMRU-K as a preferred site for future vaccine, drug, and other interventional trials.

No.	Grade	P/No	Employee Name	DESIGNATION	GRANT
	MR	P/No		Administration-Ksm	
1	11	80057	Fred Kiddy Onyango	Senior Lab Technologist	Adm-Ksm
2	9	80231	Raphael Pundo Omondi	Computer Programmer I	Adm-Ksm
3	9	80329	Dishon Humphrey Otieno	Accountant II	Adm-Ksm
4	8	80250	Shadrack O. Odera	Computer Operator I	Adm-Ksm
5	6	80262	Mildred Achieng	Senior Clerical Officer	Adm-Ksm
6	3	80274	Jeconia O.Bunde	Auxilliary Staff I	Adm-Ksm
7	3	80389	Julius M Muhanji	Auxilliary Staff I	Adm-Ksm
8	5	80351	Julius Savala Indiazi	Higher Clerical Officer	Adm-Ksm
				Administration-Nrb	
1	11	80182	Kadenge Kidiga	Senior Accountant	Adm Nrb
2	9	80079	Joyce Mburu	Personal Secretary	Adm Nrb
3	9	80134	Lucy Lodenyi	computer Programmer I	Adm Nrb
4	9	80253	Dickens O. Atieno	Assistant Research Officer	Adm Nrb
5	9	80304	Caroline C. Tungwony	Assistant Research Officer	Adm Nrb
6	8	80080	Daniel Waema	Supplies Officer III	Adm Nrb
7	7	20486	Nahashon G. Ngugi	Administrative Assistant	Adm Nrb
8	7	80432	Paul S Moriase	Admistrative Assistant	Adm Nrb
9	6	80035	Agnes Nganga	Computer Operator II	Adm Nrb
10	5	80206	John G. Kamau	Driver Grade I	Adm Nrb
11	5	80421	Charles O Morande	High clerical officer	Adm Nrb
12	5	80460	Chepkwony, Wilfred K	High clerical officer	Adm Nrb
13	4	80207	Edwin C. Mbwabi	Senior Auxiliary Staff	Adm Nrb
14	3	80277	Johnstone O Otieno	Driver Grade III	Adm Nrb
15	3	80401	Charles O Gekondo	Auxilliary Staff I	Adm Nrb
				Clinical Trials/Kombewa	
1	11	21308	Ragama B Ogutu Dr.	Research officer	MVI
2	11	80420	Adhiambo Christine G	Principal Lab.Technologist	MVI
3	10	21545	Otieno Godfrey A. Dr.	Assistant Research Officer	MVI
4	10	21586	Odhala Joash Gombe Dr.	Assistant Research Officer	MVI
5	10	80409	Oenga Ezekiel R. Dr.	Assistant Research Officer	MVI
6	9	80247	Melanie Atieno Onyango	Assistant Research Officer	MVI
7	9	80309	Achola N. Onyango	Administrativ Officer II	MVI
8	9	80380	Paul O Jaleny	Assistant Research Officer	MVI
9	9	80479	Apolo Duncan O	Assistant Research Officer	MVI
10	7	80147	Charles Okundo Okelo	Laboratory Technician II	MVI
11	7	80053	Ramadhan Mutalib	Laboratory Technician II	MVI
12	7	80232	Gordon M. Hongo	Lab Technologist III	MVI
13	7	80318	Agnes Owiti Akoth	computer Programmer I	MVI
14	7	80377	Stacy M Okalo	Clinical Officer	MVI
15	7	80382	Phoebe Muga Otieno	computer Programmer III	MVI
16	7	80384	Rosemary O Opiyo	Enrolled Nurse III	MVI
17	7	80419	Pengo Valentine O	Clinical officer III	MVI
18	7	80386	Imelda A Adongo	Enrolled Nurse II	MVI
19	7	80469	Otieno Solomon O	Enrolled Community Nurse II	MVI
20	7	80470	Ondu Priscah A	Enrolled Community Nurse II	MVI
21	7	80471	Ogutu Phoebe A.	Enrolled Community Nurse II	MVI
22	7	80472	Omondi Mary A	Enrolled Community Nurse II	MVI

23	7	80474	Wakhungu Imelda N	Clinical officer III	MVI
24	7	80475	Owino Lilian Were	Clinical officer III	MVI
25	7	80476	Okoth George F. O	Clinical officer III	MVI
26	7	80477	Iguna Sarah M	Clinical officer III	MVI
27	7	80478	Owira Victorine A	Clinical officer III	MVI
28	7	80480	Onyango Susan W A	Enrolled Community Nurse II	MVI
29	7	80495	Nyamwenga Rosemary A	Enrolled Community Nurse II	MVI
30	7	80503	Dorothy C. Mabunde	Enrolled Community Nurse	MVI
31	6	80049	Nerry Oluoch Ndiege	Laboratory Technician III	MVI
32	6	80042	Samwel Odour Wangowe	Junior Lab. Technician	MVI
33	6	80362	Dickson Amollo	Lab Technitian III	MVI
34	6	80371	Kennedy J Obonyo	Lab Technitian III	MVI
35	6	80381	Peter R Mariga	Senior Driver	MVI
36	6	80375	Veronica W Mungai	Pharmaceutical Tech	MVI
37	6	80168	Abdi Ayub	Driver Grade I	MVI
38	6	80368	James S Odera	Lab Technitian III	MVI
39	5	80374	Mary A Amondi	Computer Operator III	MVI
40	5	80167	David L. Madahana	Driver Grade II	MVI
41	5	80181	George Nyawade	Driver Grade II	MVI
42	5	80061	Philistus Oigo Ogilo	senior Auxilliary Staff	MVI
43	5	80387	Mathews O Okendo	Junior Lab. Technician	MVI
44	5	80466	Oyugi, Mary A.	Computer proggrammer III	MVI
45	5	80467	Pundo, Dennis O.	Computer proggrammer III	MVI
46	5	80492	Yogo Rebecca	Computer Operator III	MVI
47	4	80045	Joram Osumo	senior Auxilliary Staff	MVI
48	4	80054	Cyrus Ongonga Onguka	Senior Auxiliary Staff	MVI
49	4	80353	Fred Antony Aketch	Clerical Officer	MVI
50	4	80354	Beatrice O Akinyi	Clerical Officer	MVI
51	4	80358	Clarice Ogendo Adhola	Clerical Officer	MVI
52	4	80360	Daniel A. Odhiambo	Clerical Officer	MVI
53	4	80361	Moses D Olweny	Clerical Officer	MVI
54	4	80364	Elizabeth B Akinyi	Clerical Officer	MVI
55	4	80366	George O Obilo	Driver Grade III	MVI
56	4	80367	Jacob N Jagongo	Clerical Officer	MVI
57	4	80369	Jane Atieno Ombayi	Clerical Officer	MVI
58	4	80373	Linnah A Ooro	Clerical Officer	MVI
59	4	80378	Milicent Awuor	Clerical Officer	MVI
60	4	80379	Nelly A Owuondo	Clerical Officer	MVI
61	4	80376	Wycliff H Odhiambo	Clerical Officer	MVI
62	4	80490	Obadha Caroline A	Clerical Officer	MVI
63	4	80491	Langi Ronald	Clerical Officer	MVI
64	3	80165	Raphael onyango	Auxilliary Staff I	MVI
65	3	80312	Ruth Awino Opiyo	Auxilliary Staff I	MVI
66	3	80313	Charles Kangu Isiaho	Driver Grade III	MVI
67	3	80385	Caroline Adhiambo	Auxilliary Staff I	MVI
68	3	80355	Caroline A Onoka	Auxilliary Staff I	MVI
69	3	80359	Daniel O Osewe	Auxilliary Staff I	MVI
70	3	80383	Robert O Ogutu	Auxilliary Staff I	MVI
71	3	80283	George Odongo Okoth	Driver Grade III	MVI
				Formerly Entomology	
1	4	80340	Fredrick Mboya Okatch	Clerical Officer	MVI

2	4	80343	George AbwojoOdhiambo	Clerical Officer	MVI
3	4	80345	Tobias Okuku Yoga	Clerical Officer	MVI
4	4	80349	Nelson Ondu	Clerical Officer	MVI
5	3	80335	Joshua Ochieng Okero	Auxilliary Staff I	MVI
6	3	80338	Henry Ochieng	Auxilliary Staff I	MVI
7	3	80339	Caleb Rabilo	Auxilliary Staff I	MVI
8	3	80334	Eliud Odiwour Ochieg	Auxilliary Staff I	MVI
9	3	80347	Joab Odiwour Obure	Auxilliary Staff I	MVI
10	3	80348	Kennedy Omondi Ochieng	Auxilliary Staff I	MVI
11	3	80346	Nicholas Ongoro	Auxilliary Staff I	MVI
12	3	80342	Evance Ojenge	Auxilliary Staff I	MVI
				Vaccine/Immnology	
1	13	80241	Dr. John Njenga Waitumbi	Senior research officer	MVI
2	11	80068	Joseph Koros	Principal Lab.Technologist	MVI
3	11	80246	Joram Ogola Siagla	Research officer	MVI
4	11	80413	Odhiambo Kennedy H	Principal Lab.Technologist	MVI
5	9	80273	Willis Okoth	Assistant Research Officer	MVI
6	6	80244	James Gitonga	Laboratory Technician III	MVI
			Severe Malaria	**NIH Grant**	
1	11	80372	Lilian A Ogonda	Research officer	HMJF
2	11	80388	Dr.Walter Otieno	Research officer	HMJF/Tra
3	9	80259	Alfred Olweny Odindo	Clinical Officer I	HMJF
4	9	80261	William O. Odhiambo	Assistant Research Officer	HMJF
5	9	80275	Boaz Owino Owuor	Assistant Research Officer	HMJF
6	9	80307	Colins O. Odhiambo	Assistant Research Officer	HMJF
7	9	80308	Michael M. Odera	Assistant Research Officer	HMJF
8	8	80391	Fredrick M. Mucheru	Engineering Technitian	HMJF
9	8	80164	Michael Ouma Opiyo	Laboratory Technologist III	HMJF
10	8	80255	David Ousu	Clinical Officer II	HMJF
11	7	80233	Joseph Ouya Osoga	Lab Technologist III	HMJF
12	7	80310	Titus o. Apindi	Laboratory Technologist III	HMJF
13	7	80260	Vincent Oloo Otieno	Clinical Officer III	HMJF
14	6	80370	Kennedy O Dudi	Lab Technitian III	ILIR
15	6	80263	Charles Otieno Adega	Lab Technician III	HMJF
16	4	80050	Consolata Onyango	senior Auxilliary Staff	Ellison
17	3	80356	Caroline Atieno	Auxilliary Staff I	Ellison
18	3	80245	Maurice Odongo Otieno	Driver Grade III	ILIR
19	3	80311	Joseph Thomas Onyango	Driver Grade III	ILIR/Elliso
				RETROVIROLOGY	
1	11	80044	David Kiplangat Chumo	Principal Lab.Technologist	Retro
2	11	20260	Kibaya Rukia M	Principal Lab.Technologist	Retro
3	11	21346	Kipmutai Robert L Dr.	Research Officer	Retro
4	11	80502	Obiero Jackton O	Research Officer	Retro
5	10	80279	Dr. Dorothy W. Njeru	Assistant Research Officer	Retro
6	10	80452	Cheruiyot Dr. SK	Assistant Research Officer	Retro
7	9	80406	Koech Hillary K	Accountant II	Retro
8	9	80251	Lilian Chepkemoi	Assistant Research Officer	Retro
9	9	80281	Wilfred Langat	Public Health Officer	Retro
10	9	80400	Bornes C.Korir	Assistant Research Officer	Retro

11	9	80397	Ignatius Kipnge'etich	Assistant Research Officer	Retro
12	9	80398	Rachael K Kamau	Assistant Research Officer	Retro
13	9	80428	Imbuki K Osotsi	Assistant Research Officer	Retro
14	9	80429	Langat Jayme C	Assistant Research Officer	Retro
15	9	80430	Mulwa S Redempta	Assistant Research Officer	Retro
16	9	80431	Ngeno Weldon K	Assistant Research Officer	Retro
17	9	80450	Mokaya John N	Assistant Research Officer	Retro
18	9	80451	Kimeto Mary L	Assistant Research Officer	Retro
19	9	80456	Yegon Peter K	Assistant Research Officer	Retro
20	9	80459	Katharane Mary N	Assistant Research Officer	Retro
21	9	80485	Leonida N. Mongare	Assistant Research Officer	Retro
22	8	80427	Cheruiyot J Chepkorir	Nursing Officer II	Retro
23	8	80436	Odhiambo Hulda A	Administrator/Counsellor	Retro
24	8	80449	Odema Antoninah A	Nursing Officer II	Retro
25	7	80392	Loice C Cheruiyot	Lab Technologist III	Retro
26	7	80330	Roseline Bosibori Vicky	Lab Technologist III	Retro
27	7	80396	Eric K Rono	Lab Technologist III	Retro
28	7	80403	Pamela A Pande	Lab Technologist III	Retro
29	7	80325	Judy Chebet Bosuben	Community Field Worker	Retro
30	7	80332	Susan Adega	Administartive Assistant	Retro
31	7	80282	Caleb Omware Achieng	Community Field Worker	Retro
32	7	80327	Peter Mikaye Ondieki	Community Field Worker	Retro
33	7	80322	Dennis Ouma Otieno	Community Field Worker	Retro
34	7	80426	Mburu Jacinta Wambui	Nursing Officer III	Retro
35	7	80435	Langat Henry Kipngetich	Administrator/Counsellor	Retro
36	7	80442	Airo Alice Makungu	Short hand typist	Retro
37	7	80443	Kimani Thomas	Community Field Worker	Retro
38	7	80446	Engoke Grace Induti	Library Assistant	Retro
39	7	80454	Rono Bernard K	Clinical Officer III	Retro
40	7	80462	Kamau Esther N	Clerical Officer III	Retro
41	7	80463	Koskei Peter K	Clerical Officer III	Retro
42	7	80483	Argwings O. Miruka	Clinical Officer	Retro
43	7	80482	Henry M Sabwengi	Laboratory Technologist III	Retro
44	7	80501	Sigei Lucy C	Laboratory Technologist III	Retro
45	6	80257	Michael O. Obonyo	Enrolled Nurse III	Retro
46	6	80393	Anthony A Keya	Assistant Cateress	Retro
47	6	80285	Fredrick Ouma Waga	Lab Technologist III	Retro
48	6	80284	Francis Ochieng Opiyo	Lab Technologist III	Retro
49	6	80448	Owede June A.	Nutrition Field Worker	Retro
50	5	80323	Everlyn Ngetich	Higher Clerical Officer	Retro
51	5	80457	Wambua Winfred	Copy Typist II	Retro
52	5	80484	Daniel Cheruiyot	Assistant cateress II	Retro
53	4	80286	Vincent Oduur Osewe	Clerical Officer	Retro
54	4	80328	Roselidah Oyunga Oyunga	Clerical Officer	Retro
55	4	80316	David Kamadi Onyino	Clerical Officer	Retro
56	4	80315	Johnson Ndungu Shiyai	Clerical Officer	Retro
57	4	80314	Jude Kitur	Driver Grade II	Retro
58	4	80423	Martim Josphine C	Clerical Officer	Retro
59	4	80424	Ondego Joyce Ageyo	Clerical Officer	Retro
60	4	80425	Obiero Emelda Akinyi	Clerical Officer	Retro
61	4	80439	Ariba Nixon Olungati	Clerical Officer	Retro
62	4	80440	Chepkwony Geoffrey	Driver Grade II	Retro

63	4	80441	Langat Geoffrey	Clerical Officer	Retro
64	4	80444	Odhiambo John	Driver Grade II	Retro
65	4	80453	Bett Justice K	Driver Grade II	Retro
66	4	80458	Ngetich Paul K	Clerical Officer	Retro
67	4	80499	Anyona Geoffrey V	Driver Grade II	Retro
68	4	80500	Mwangi Geoffrey k	Clerical Officer	Retro
69	3	80324	James Obino	Auxilliary Staff I	Retro
70	3	80331	Samwel Obino	Auxilliary Staff I	Retro
71	3	80394	Edna C Mutai	Auxilliary Staff I	Retro
72	3	80399	Bernard Oronje	Auxilliary Staff I	Retro
73	3	80402	Florence Malesi	Auxilliary Staff I	Retro
74	3	80437	Kiromboto Rose k	Auxilliary Staff I	Retro
75	3	80438	Rugut Eric	Driver Grade III	Retro
76	3	80445	Rono Paul Cheruyuit	Auxilliary Staff I	Retro
77	3	80455	Koske Emily C	Auxilliary Staff I	Retro
78	3	80481	Agnes Chepngetich	Auxilliary Staff I	Retro
79	3	80497	Okello Eunice A.	Auxilliary Staff I	Retro
80	3	80498	Mogere Lukas M	Auxilliary Staff I	Retro
				PMTCT	
1	9	80415	Rono C Hellen	Assistant Research Officer	PMTCT
				BU	
1	9	80326	Margaret Rono	Assistant Research Officer	BU
2	8	80414	Sigei Caroline C	Computer Programer II	BU
			Vector Studies-Entomology		
1	11	80280	Sichangi Kasili	Research Officer	Ento
2	8	80063	Christopher Oyaro (onger)	Laboratory Technician I	Ento
3	8	20456	Alexander M. Makau	Lab Technitian I	Ento
4	6	80072	Juma Makasa	Lab Technologist III	Ento
4	4	80034	Samwel K. Ligonzo	senior Auxilliary Staff	Ento
5	4	80252	Maurice Otieno Agawo	senior Auxilliary Staff	Ento
6	4	80350	Daniel O Ngonga	Clerical Officer	Ento
7	4	80336	Francis Gare Ngere	Clerical Officer	Ento
8	4	80337	Nicholas O Odemba	Clerical Officer	Ento
9	3	80341	Albert Ochola Olang	Auxilliary Staff I	Ento
10	3	80352	Charles Otieno Okumu	Driver Grade III	Ento
11	3	80390	Kizito Amuhaya	Auxilliary Staff I	Ento
			Malaria Nairobi	**GEIS SPONSORED**	
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2	9	80254	Pamela Liyala	Assistant Research Officer	GEIS
3	9	80317	Freddrick Lunyagi Eyase	Assistant Research Officer	GEIS
4	9	80461	Wadegu Meshack	Assistant Research Officer	GEIS
5	8	80066	Josphat Mwangi Kabui	Laboratory Technician I	GEIS
6	8	80306	Julia Wangui Mwangi	Laboratory Technologist II	GEIS
7	7	80039	John Kamanza	Laboratory Technician II	GEIS
8	6	21423	Finley Osuna	Laboratory Technician III	GEIS
9	5	80074	Jecinta Wanjiru	senior Auxilliary Staff	GEIS
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1	9	80333	Hoseah Miima Akala	Assistant Research Officer	GEIS
2	9	80305	Shirley C.Segecha	Assistant Research Officer	GEIS
3	7	30081	Victor Otieno Ofula	Lab. Technologist 111	GEIS
4	7	30083	Clayton O Onyango	Lab. Technologist 111	GEIS
7	7	80408	Jeremiah K Kambi	Clinical Officer III	GEIS
8	6	80407	Ruth Sarah Mupa	Lab Technitian III	GEIS
			KEMRI SECONDED	**GEIS SPONSORED**	
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2	13	20277	William K Sang	Principal Research officer	GEIS
3	12	20405	Maurice Adoyo Adoyo	Senior Research Officer	GEIS
4	12	21078	Dr. Jane Mbui	Senior Research Officer	GEIS
5	11	20419	Gitonga Charles M	Principal Lab Technologist	GEIS
6	10	21560	Konongoi Samson Dr.	Assistant Research Officer	GEIS
7	7	20957	John M Gachoya	Lab technitian II	GEIS
8	7	21280	Ernest Mabinda	Lab technitian II	GEIS
9	5	21272	Dannish Odera	Junior Lab Technologist	GEIS
10	3	20183	Dustone Beti	Driver Grade III	GEIS
			ENTERICS		
1	9	80417	Paulomi Patel	Assistant Research Officer	GEIS
2	9	80418	Bonventure W. Juma	Assistant Research Officer	GEIS
3	9	80416	Njogu Elizabeth W	Assistant Research Officer	GEIS
4	8	80069	Michael Ouko	Laboratory Technician II	GEIS
5	7	80230	Valerie A . Oundo	Junior Lab. Technician	GEIS
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2	11	80278	Rachael Anyango Achila	Research Officer	9RQU
3	9	80464	Rosemary M Nzunza	Assistant Research Officer	9RQU
			Drug Study		
1	7	80468	Okeyo Immaculate A	Short hand typist	Drug Study
2	7	80473	Kifuso Hope M	Nursing Officer III	Drug Study
3	6	80493	Odhiambo Agustine	Senior Clerical officer	Drug Study
4	4	80488	Gwala Michael	Driver Grade II	Drug Study
5	4	80489	Amimo Julius O	Driver Grade II	Drug Study
6	3	80486	Masingu Mackinus	Driver Grade III	Drug Study
7	3	80487	Gwada Francis R	Driver Grade III	Drug Study